Example Answers Using Particle Theory

"How does a thermometer measure temperature?"

R You put it in the liquid and the red line tells you the temperature.

There is no reference to any science in this answer.

1 When the thermometer gets hot the stuff inside moves up because hot things move around more. You can then read the temperature from the lines.

This answer is on topic, and shows an attempt to reference the particle theory to explain what is happening.

2 Particles are spread out and that changes when they get hot. If the thermometer gets hot the stuff moves up because they move away. You can know the temperature because it is written on the outside.

This answer is correct, referencing the correct postulate of the particle theory, and has started to provide an explanation. However, this answer is lacking clear details to fully explain the answer.

3 There is space between all particles. The spacing between particles is related to the temperature of particles. The thermometer is filled with alcohol and when it gets hot it will increase the spacing between the particles. This increases the volume of the alcohol. When the alcohol gets "bigger" it will rise up the thermometer. The lines on the outside of the thermometer are used to tell the temperature. The higher the temperature, the higher the alcohol will rise. The reverse is true as well, when the alcohol cools down the spaces between the particles shrink, so the alcohol moves down.

This answer is correct, clearly indicating the correct postulate from the particle theory, and also has a clear explanation of how this postulate applies.

4 The particle theory of matter tells us that there is space between all particles. The spacing between particles is related to the temperature of, or the amount of energy in, those particles. When a thermometer is placed in a fluid that is warmer than the thermometer the particles of the fluid will transfer heat energy to the thermometer. The thermometer is filled with alcohol, which will absorb this heat energy, increasing the temperature of the alcohol, which in turn increases the spacing between the particles of alcohol. This increases the volume of the alcohol. The alcohol is contained within the thermometer, which has a very thin cylindrical space inside it, the alcohol will fill more of that space, meaning it will "rise" up the thermometer. The gradient lines on the outside of a thermometer have been calibrated to relate the height of the alcohol to the temperature of that alcohol. The higher the temperature, the higher the alcohol will rise. Alternatively, if the substance in which the thermometer is place is colder than the thermometer, the thermometer will give off heat energy and the alcohol inside will reduce in volume (smaller spaces between particles).

Has all aspects of a level 3 answer, and also provides extensive details to explain or extend thoughts. "Why" or "How" are used.